

## SECTION 033000 - CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

## 1.1 DESCRIPTION

- A. Basic specification: Perform work of this Section according to ACI 301-99, "Specifications for Structural Concrete for Buildings", except as specifically modified herein. Numbers in parentheses (0.00) indicate a related paragraph of ACI 301.
- B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas.
- C. Provide concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details with requirements of equipment being supplied, prior to placing concrete.
- D. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.
- E. Inspection and testing services required by this Section to establish mix designs are to be performed by an agency retained by the Contractor (1.6.3).
- F. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work, which includes but is not limited to:
  - 1. Masonry: Section 042000
  - 2. Structural Steel: Section 051200
  - 3. Steel Joists: Section 052100
  - 4. Metal Decking: Section 053100

## 1.2 QUALITY ASSURANCE

- A. Reference standards:
  - 1. ACI 318, Building Code Requirements for Reinforced Concrete.
  - 2. ACI 315R, Manual of Standard Practice for Detailing Reinforced Concrete Structures.
  - 3. ACI 347R, Guide to Formwork for Concrete.
  - 4. ACI 304, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
  - 5. "Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.

## 1.3 SUBMITTALS

- A. Submit for approval the name of the agency proposed for the required inspection and testing services. If some or all of the required testing is to be performed by personnel not employed by the proposed agency, submit letter from the agency stating that those personnel are qualified to perform the tests.

- B. Submit a mix design for each class of concrete required (1.6.3). Concrete proportions shall be established on the basis of previous field experience or trial mixtures (4.2.3).
- C. Submit shop drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric (3.1.1).
- D. Submit, on request only, product literature for admixtures and curing compounds proposed for use.
- E. Submit reports of all required testing and inspection.

#### 1.4 FIELD REFERENCE MANUALS

- A. Provide at least one copy of the ACI Field Reference Manual, SP-15 (1.3.3), and one copy of CRSI's "Placing Reinforcing Bars", in the field office at all times.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Cement (4.2.1.1): Portland Cement, ASTM C150, Type I. Type III (high early strength) may be used with written approval and at the Contractor's expense. All cement for concrete exposed to view to be from the same mill.
- B. Water: Potable.
- C. Aggregates: ASTM C33, (4.2.1.2). Use size no. 8 for coarse aggregate in toppings. For all other classes, use size no. 57.
- D. Admixtures (where required or permitted):
  - 1. Water-reducing: ASTM C494, Type A or D (4.2.1.4).
  - 2. Mid-range water-reducing admixture: ASTM C494, Type A (4.2.1.4).
  - 3. Air-entraining: ASTM C260 (4.2.1.4).
  - 4. High-range water-reducing admixture (superplasticizer): ASTM C494, Type F or G (4.2.1.4).
  - 5. Non-chloride, non-corrosive accelerator: ASTM C494, Type C or E (4.2.1.4).
  - 6. Fly ash: ASTM C618, Type C or F (4.2.1.1.c).
  - 7. Ground granulated blast-furnace slag: ASTM C989 (4.2.1.1.d).
  - 8. Calcium chloride is NOT permitted (4.2.2.6).
  - 9. Use of admixtures other than those listed will be permitted only when approved prior to bid.
- E. Reinforcing (3.2.1):
  - 1. Deformed bars: ASTM A615, A616, A617, or A706. Minimum yield strength to be 60 ksi.
  - 2. Welded wire fabric: ASTM A185. Provide in sheet form for all uses other than slabs-on-grade.
- F. Premolded expansion joint filler: ASTM D1751, (2.2.1.4).

- G. Curing compound and sealer: ASTM C309 moisture retention. The compound shall be a water based membrane forming liquid, 15% solids content minimum. The following are acceptable:
1. Super Diamond Clear VOX, by Euclid.
  2. Super Aqua - Cure VOX, by Euclid.
  3. Masterkure 200W, by Master Builders.
  4. Kure-N-Seal W, by Sonnebourne-Contech Co.
- H. Grout for masonry core fill: ASTM C476, coarse type.
- I. Grout under steel base plates and bearing plates: Non-shrinking, metallic or non-metallic, with minimum 28 - day strength of 5000 psi, when mixed to a fluid consistency. The following are acceptable:
1. Embeco 636, by Master Builders.
  2. Ferrolith G, by Sonneborn.
  3. Crystex, by L and M Construction Chemicals.
- J. Vapor Retarder:
1. Conform to ASTM E1745 AStandard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
  2. Minimum thickness of vapor retarder shall be 10 mils if placed below granular fill, 20 mils when placed above granular fill.
- K. Granular Fill below slabs on grade: 4" of ODOT 304 or approved equal.

2.2 MIXES - The following classes of concrete are required (4.2.2.8):

Type	F'c(28 day)	Min. Cement Content	Maximum Water Cement Ratio	Air Content
Class I footings, grade beams, and all other below grade concrete	3,000 PSI	470	--	optional
Class II interior slabs on grade unless noted otherwise	3,500 PSI	517	0.50	optional
Class III interior slabs on grade which receive moisture sensitive floor coverings	4,000 PSI	540	0.45	optional
Class V exterior flat work, and any concrete exposed to weather	4,000 PSI	564	0.45	5 to 7%
Class VI lean concrete, mud slabs	1,500 PSI	376	--	optional

- (1) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
- (2) Fly ash is permitted in all classes, but shall not exceed 15% of cement weight indicated above and can be included in the water-to-cement ratio.
- (3) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
- (4) Concrete for Class III slabs on grade must include a mid-range or high-range plasticizer. Water addition at the site will not be permitted.
- (5) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Structural Engineer and verification that the water-to-cement ratio has not been exceeded.
- (6) Ground granulated blast-furnace slag is permitted in all classes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cement ratio.

### PART 3 - EXECUTION

#### 3.1 SURFACE CONDITIONS

- A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete (5.3.1).
- B. Determine field conditions by actual measurement.
- C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Architect is present, unless this requirement is specifically waived.

#### 3.2 FORMWORK

- A. Footings may be cast against earth cuts when soil conditions permit.
- B. Removal of forms and shoring:
  1. Remove no forms within 24 hours after placement.
  2. Shoring is to remain in place until concrete reaches its design strength. Windsor Penetrometer is to be used to verify in-place strength if forms are removed prior to 28 days after casting concrete.

#### 3.3 VAPOR RETARDERS

- A. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity controlled area.
- B. Vapor retarder shall be installed in accordance with ASTM E1645 A Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
- C. Where required, thickness of vapor retarder and placement shall conform to the following:
  1. When slabs are placed prior to the installation of the waterproof roof membrane, the vapor retarder shall be a minimum of 20 mils thick and placed directly on the granular fill, below the concrete floor slab. Granular fill shall be a minimum of 4" of well-graded granular material, equivalent to ODOT 304.

2. When slabs are placed after the installation of the waterproof roof membrane, the vapor retarder shall be a minimum of 10 mils thick and placed on the prepared subgrade, below the granular fill. Granular fill shall be a minimum of 4" of well-graded granular material, equivalent to ODOT 304.

### 3.4 JOINTING

#### A. Interior slabs on grade:

1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, inside corners. For reinforced or unreinforced slabs, maximum joint spacing to be 2 1/2 times slab thickness (ie., for 4" slabs, at 10'-0" on center). Schedule slab pours and sawcutting operations such that sawing is completed prior to onset of shrinkage cracking (5.3.5).
2. Provide isolation joints at columns (1/2 inch thick) and at walls (1/8 inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.

#### B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):

1. Expansion joints: Full depth, with 1/2 inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.

### 3.5 FINISHES

#### A. Schedule of finishes on flatwork is as follows:

1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish (5.3.4.2.c).
2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish (5.3.4.2.b).
3. Exterior slabs - broom finish (5.3.4.2.d).
4. Areas indicated on Drawings:
  - a. Non-slip (5.3.4.2.h).
  - b. Hardener - per manufacturer's instructions, under direction of manufacturer's representative (5.3.4.2.e).

#### B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117 (5.3.4.3):

1. Minimum flatness of F (f) 30, and a minimum levelness of F (l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F (f) 50, and F (l) 30 shall be obtained.

#### C. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner (1.7.1).

### 3.6 CURING AND PROTECTION

#### A. Temperature:

1. When air temperature during placement is less than 40 degrees, or will be within 24 hours, temperature of concrete as placed is to be between 50 and 90 degrees (55 and 90

degrees for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days. (4.2.2.7 and 5.3.1.6).

2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used.

B. Curing:

1. Interior slab areas which will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, a surface hardener, waterproofing, or epoxy or urethane coatings, are to be moist-cured for a minimum of 7 days, without the use of a curing compound (5.3.6.4.a through 5.3.6.4.c).
2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 3 to 7 days. Edges and joints are to be sealed. Rewetting of the slab at anytime during construction should be avoided.
3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound (5.3.6.4.e), except that when concrete above grade is placed in the open, and the air temperature exceeds 60 degrees, the concrete is to be moist-cured for the first 24 hours.
4. Whichever curing method is used, it is to commence immediately after placement (5.3.6.1). Do not allow curing to be delayed overnight.
5. Prevent excessive moisture loss from formed surfaces (5.3.6.3). If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

3.7 FIELD QUALITY CONTROL

- A. Obtain concrete for required tests at point of placement. If concrete is pumped, obtain concrete for tests at discharge end (1.6.4.3).
- B. For each concrete class other than lean concrete, perform one strength test for each 50 yards or fraction thereof, for one day placement of up to 300 yards (1.6.4.2.d). Perform one strength test for each 100 yards or fraction thereof, for one day placements of greater than 300 yards.
- C. Determine slump for each strength test (1.6.4.2.f).
- D. Determine air content for each strength test of Class V concrete (1.6.4.2.h).
- E. Determine concrete temperature for each strength test (1.6.4.2.g).
- F. Do not place concrete when slump, air content, or temperature vary from allowable (1.6.8).
- G. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E1155. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.
- H. Maintain records of all tests, indicating exact location of the structure represented by each test.

- I. Test cylinders shall be stored at the jobsite for the first 20 hours, plus or minus 4 hours, in a protected location, with the temperature maintained between 60 and 80 degrees, or the results of the strength tests shall be considered unacceptable.
- J. All field testing and inspections shall be performed by an ACI Concrete Field Testing Technician Grade 1, or equivalent (16.2).

END OF SECTION 033000

## SECTION 033113 – QUARRYSTONE ARCHITECTURAL CONCRETE

## PART 1 - GENERAL

## 1.1 SCOPE OF WORK

- A. Furnish materials, labor, transportation, services, and equipment necessary to furnish and install architectural concrete paving as indicated on Drawings and as specified herein.
- B. Work included in this Section:
  - 1. Installation of QuarryStone™ architectural concrete paving. Contact T.B. Penick & Sons, Robert Bennett @ (614) 801-1844.

## 1.2 REQUIREMENTS OF REGULATORY AGENCIES

- A. Federal, State and local laws and regulations governing this Work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship, or a level of construction that exceeds the level of Federal, State, or local requirements, provisions of this Section take precedence.

## 1.3 APPLICABLE STANDARDS

- A. Specifications and recommended practices of American Concrete Institute (ACI), American Society for Testing and Materials (ASTM).
- B. Design and Control of Concrete Mixtures – Thirteenth Edition; Portland cement Association.

## 1.4 QUALITY CONTROL

- A. Quality control to be maintained by qualified installers of QuarryStone™ throughout duration of project.
- B. Paving Subcontractor Qualifications: provide evidence to indicate successful experience in providing QuarryStone™ similar to that specified herein and demonstrate successful experience.
- C. Demonstration of experience: provide a minimum of 5 projects with in a 800 mile radius of project site of installed QuarryStone™ architectural paving totaling at least 50,000 s.f. with reference list of each containing contact person and phone # of project architect's and owner rep.
- D. Supervision: On site superintendent must have a minimum of 5 years experience installing QuarryStone™.
- E. Slip Resistance: provide a finish with a slip resistance of equal or greater than 0.65 when tested by the owner in accordance with ASTM F 489.

## 1.5 SITE INSPECTION

- A. Verify conditions at site that affect work of this Section.
- B. Take field measurements as required.

- C. Report major discrepancies between Drawings and field dimensions to Owner's Authorized Representative prior to commencing work.

#### 1.6 SUBMITTALS

- A. Product Data: Submit no later than 10 days after contract award a typed list of products specified in this Section.
- B. Shop Drawings:
  - 1. Submit shop drawings for reinforcing steel and accessories in accordance with ACI standards.
  - 2. Paving Jointing and Pour Sequence Plan - submit six blueprints indicating the following:
    - a. Proposed layout of contraction, construction and isolation joints. Clearly delineate the three different joint types.
    - b. Layout of paving types as indicated on Drawing Paving Schedule. Give overall dimensions of each paving type.
    - c. Concrete pour sequence. Indicate sequence of paving pour installation.
- C. Statement of Mix Design: Submit (1) copy of Statement of Mix Design prepared by batch plant servicing Project for each load delivered to Project. Statement of Mix Design to contain following information:
  - 1. Name, address, and telephone number of batch plant preparing statement of mix design.
  - 2. Date of mix design.
  - 3. Project location.
  - 4. Contractor requesting load delivery.
  - 5. Mix design number.
  - 6. Integral color used.
  - 7. Gradations for sand and aggregate.
  - 8. Material weights, specific gravity, and absolute volumes.
  - 9. Basis of testing, i.e. UBC 2605 D4 and Title 24 2604 D4.
  - 10. Water/cement ratio.
  - 11. PSI rating.
  - 12. Signature of testing laboratory manager.
  - 13. Signed stamp from registered Project structural engineer or architect.
- D. Washed Concrete Sand (extra stock):
  - 1. One 50-pound sealed bag of washed concrete sand similar to type used during installation of QuarryStone™.

#### 1.7 SUBSTITUTIONS

- A. None allowed unless approved in writing by Owner's Authorized Representative prior to bid opening.

#### 1.8 TESTING

- A. A testing agency may be designated by Owner or Owner's Authorized Representative. Testing personnel to meet ASTM E329 requirements.

### 1.9 MOCK-UPS

- A. Prior to construction, provide (1) 3-foot x 3-foot x 3-inch sample of each QuarryStone™ paving type specified on Drawings.
- B. Ensure that each mock-up contains joint types specified on project, i.e. construction, contraction, and isolation.
- C. Locate mock-ups in a conveniently accessible and protected place. Approved mock-ups will be standard for future QuarryStone™ installation review.
- D. Remove mock-ups from site upon completion of Work and approval by Owner's Authorized Representative.

### 1.10 PROJECT CONDITIONS

- A. Keep Work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with work of other trades.

### 1.11 PRODUCT HANDLING

- A. Store materials in a dry and protected location. Protect reinforcing steel and dowels from rusting, deformation, staining, and moisture damage.
- B. Keep QuarryStone™ materials dry at all times prior to installation.

### 1.12 COORDINATION

- A. Notify Owner's Authorized Representative and contractors performing work related to installation of Contractor's Work in ample time, so as to allow sufficient time for them to perform their portion of work.

## PART 2 - PRODUCTS

### 2.1 PORTLAND CEMENT

- A. Type I, IA, II, IIA, III, IIIA, IV, and V cements, to conform to ASTM C150.
- B. Use same brand of cement from single source throughout entire project.
- C. Refer to SECTION 033000 – CAST-IN-PLACE CONCRETE for cement type specified.

### 2.2 WASHED CONCRETE SAND

- A. Clean, hard, and durable washed concrete sand, conforming to ASTM C33.
- B. Use same sand from single source throughout entire project.
- C. Granular Fill below slabs on grade: 4" of ODOT 304 or approved equal.

### 2.3 COURSE AGGREGATE

- A. Clean, hard, and durable coarse aggregate, conforming to ASTM C33.
- B. Use same aggregate from single source throughout entire project.

### 2.4 QUARRYSTONE™ SPECIFIC PRODUCTS

- A. Refer to Drawings for specified QuarryStone™ finishes, color and dosing percentage.
- B. Use same QuarryStone™ aggregate from single source for each paving type specified throughout entire project.
- C. Paving Types as specified on drawings.

### 2.5 WATER

- A. Free from deleterious materials such as oils, acids, and organic matter.

### 2.6 ADMIXTURES

- A. Integral Concrete Coloring Admixture: Refer to Drawings for color type and manufacturer.
  - 1. Acceptable Manufacturers:
    - a. L.M. Scofield; (800) 800-9900.
    - b. Solomon; (800) 624-0261
    - c. Colorfull by Admixtures, Inc.; (626) 357-3263.
    - d. Davis Color; (323) 269-7311
- B. Air Entrainment Admixtures: Conforming to ASTM C260.
  - 1. Acceptable Manufacturers:
    - a. Grace Construction Products; Daravair®, (800) 433-0020 or [www.graceconstruction.com/concrete/air\\_entraining.html#daravair](http://www.graceconstruction.com/concrete/air_entraining.html#daravair).
    - b. Master Builders, Inc.; Micro-Air®, (800) 628-9990 or [www.masterbuilders.com/MB/pub/Product.asp?TypeCat=2&ParentID=78&ProductID=22](http://www.masterbuilders.com/MB/pub/Product.asp?TypeCat=2&ParentID=78&ProductID=22).
    - c. Or Approved Equal.
- C. Water Reducing Admixtures: Conforming to ASTM C494, Type A.
  - 1. Acceptable Manufacturers:
    - a. Grace Construction Products; WRDA® (800) 433-0020 or [www.graceconstruction.com/concrete/water\\_reducers.html#wrda](http://www.graceconstruction.com/concrete/water_reducers.html#wrda).
    - b. Master Builders, Inc.; Micro-Air® (800) 628-9990 or [www.masterbuilders.com](http://www.masterbuilders.com).
    - c. Or Approved Equal.

### 2.7 READY MIXED CONCRETE

- A. Batched, mixed and transported in accordance with ASTM C94 - "Specifications for Ready Mixed Concrete."

## 2.8 REINFORCING

- A. Reinforcing Steel: Conforming to ASTM A615, clean and free of loose rust, dirt, grease or oils.
- B. Tie Wire: 16-gauge plain cold-drawn steel conforming to ASTM A82, clean, and free of loose rust, dirt, grease or oils.
- C. Supports for Reinforcement:
  - 1. Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars in place.

## 2.9 ISOLATION JOINT MATERIALS

- A. Refer to Section 07900 – Joint Sealers for isolation joint construction.

## 2.10 FLY ASH

- A. ASTM C618 - Type F. While fly ash may be used when installing QuarryStone™ when LEED certification is a concern or as a tool to enhance color it should under no circumstances be used to replace more than 30% (by weight) of the cement content of the proposed mix.

## PART 3 - EXECUTION

### 3.1 SUBGRADE

- A. Sub-grade to meet requirements of project's soils report.
- B. Ensure that a minimum 4-inch layer of FREE DRAINING graded washed aggregate or clean, washed and graded concrete sand compacted to 95 percent relative compaction is placed over sub-grade prior to placing concrete.
- C. Place all aggregate base material to a smooth plane ensuring proper slab design thickness to a tolerance plus or minus 1/2".
- D. Ensure that utilities, including irrigation lines are buried and compacted below bottom of aggregate layer.
- E. Keep base damp prior to placing concrete.

### 3.2 FORMING

- A. Be responsible for design and engineering of form work as well as its construction.
- B. Ensure that Work conforms to recommended practice for concrete form work (ACI 347), latest edition.
- C. Ensure that form lumber is #2 or better grade wood. Do not use used form lumber.
- D. Perform form layout with a digital electronic transit for line layout accuracy.
- E. Allow forms to remain in place long enough to allow concrete to set properly. Remove forms when appropriate.

### 3.3 DESIGN OF MIXES AND PROPORTIONING

- A. Proportion and mix of cement, aggregate, admixture and water to attain required plasticity and strength in accordance with current edition of ACI Manual of Concrete Practice and PCA "Design and Control of Concrete Mixtures."
- B. Concrete mixtures to be designed by an approved commercial testing laboratory, using approved materials to obtain specified minimum compressive strength.
- C. Concrete Mix Criteria:
  - 1. Slump: 5-inch max., with a 1/2-inch slump differential between successive batches. Obtain approval from Owner's Authorized Representative if slump is outside these parameters.
  - 2. Minimum PSI Rating at 28 days: 4,500.
  - 3. Cement quantity per yard of mix:
    - a. Minimum: 6 sack.
    - b. Maximum: 7 sack.
  - 4. Water/cement ratio: 0.45 – 0.52.
  - 5. Sand: 50-55% of total mix.
  - 6. Blended Gravel: 45-50% of total mix.
  - 7. Admixtures:
    - a. Air entrainment: 4 - 7%.
    - b. Shrinkage Reducing: Do not exceed 2% by weight of cement.
  - 8. Fly ash: Use when seeding reactive QuarryStone™ aggregates.
  - 9. Non-Chloride Accelerators: Do not use corrosive accelerators such as calcium chloride.
  - 10. Concrete Delivery: Use of concrete loads exceeding 90 minutes from time of batch plant must be approved by Owner's Authorized Representative.
  - 11. Ensure that batch plant guarantees single source supply for cement, sand, and aggregate for the entire project.
  - 12. Final mix designs shall be based on criteria above and meet critical minimum points stipulated in items 2,4, and 7 above. Other items may vary by geographical region and require certain modifications but shall in no way compromise the strength and integrity of mix design stipulated.

### 3.4 QUARRYSTONE® INSTALLTION

- A. QuarryStone™ is a proprietary paving process. Installation of QuarryStone™ architectural paving systems must be performed by a qualified installer only.
- B. Contact T.B. Penick and Sons, Inc. at (614) 801-1844 for a qualified QuarryStone™ installer in project area.
- C. QuarryStone® process incorporates use of following proprietary products:
  - 1. Lithocrete Etch Retarder™.

### 3.5 JOINTING

- A. Refer to ACI 302 "Guide for Concrete Floor and Slab Construction" for work under this section.
- B. Construction and Contraction Joints:

1. Saw-cut construction and contraction joints in locations indicated on Drawings.
2. Perform jointing with a new diamond tip circular saw.
3. Joint Width: Per Drawings. Do not exceed 3/16-inch in width.
4. Depth of saw-cuts: 1/4th depth of slab.
  - a. Decorative Saw-cut Joints: Per Drawings.
5. Saw-cut joints in a true and straight line with no over-cutting.

C. Isolation Joint Caulking:

1. Install isolation joint caulking to be installed under Section 07900 – Joint Sealers.

### 3.6 CURING

- A. After initial QuarryStone™ exposure, continuously sprinkle or fog paving with water for minimum 7 days or install a moisture retaining, non-staining, non-woven curing cover and maintain sufficient moisture under cover to provide for 100% humidity conditions at QuarryStone™ surface for a minimum of 7 days. Cover shall be reflective in nature to prevent excessive heat build up under cover and allow for optimal curing conditions. In the absence of a continuous moist cure a dissipating membrane cure may be substituted subject to approval by QuarryStone™ installer.

### 3.7 SEALING

- A. Seal surface of paving using QuarryStone™ approved penetrating Sealer.
- B. Final cleaning, staining, caulking, and sealing operations shall not commence until QuarryStone™ surfaces have been completely and properly cured or 28 days which ever is later.
- C. Follow Sealer Manufacturer's directions when applying this product.

END OF SECTION 033000

## SECTION 035113 – TECTUM DECK REPAIR

## PART 1 - GENERAL

## 1.1 SCOPE OF WORK

## A. GENERAL STATEMENT:

1. Coordinate all work closely with Owner's Representative as it relates to the deck repair. Deck repairs will be performed where and as directed by the Owner's Representative, and as identified in the project specifications and drawings.
2. Closely inspect any uncovered condition and alert Owner or his Representative to any condition that may interfere with the performance of the deck repairs.

## B. INTENT OF SPECIFICATION:

1. It is the intent of this specification to provide repairs to deteriorated areas of existing structural cementitious wood fiber decking. The repaired decking must be able to support the applicable live and dead loads, and provide a suitable substrate for the application of new roof system.

## C. DECK REPAIRS:

1. Areas of cementitious wood fiber decking shall be replaced with new cementitious wood fiber decking, if the deck has deflected greater than 1/180, or if the deck has visibly been damaged by moisture infiltration. The contractor shall include 730 square feet of deck replacement in the Base Bid.

## 1.2 QUALITY ASSURANCE

## A. Reference standards:

1. AISI – American Iron and Steel Institute.
2. AISC – American Institute of Steel Construction.
3. ACI – American Concrete Institute.
4. Tectum – Technical Bulletin 64.

## B. Regulatory Requirements: Comply with the provisions of the following codes and standards, except as otherwise shown or specified:

1. International Conference of Building Officials – Research Report No. 1116.
2. Building Officials and Code Administrators International, Inc. – Research Report No. 86-39.

## 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each type of deck, accessory, and product specified.
- B. Product Certifications: Submit manufacturer's certification that the products meet or exceed the specification requirements.

## 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect deck from moisture, deformation, and other damage during delivery, storage, and handling.

- B. Stack deck on platforms or pallets and protect with waterproof covering and ventilate to avoid condensation.
- C. Material shall be located on site in manner that overloading of any of the individual framing members does not occur.
- D. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cementitious Wood Fiber Roof Deck:
  - 1. Material: Aspen wood fibers bonded with inorganic hydraulic cement
  - 2. Thickness: To match existing
  - 3. Span Condition: One or two
  - 4. Style: To match existing
  - 5. Side Joints: To match existing
  - 6. Interior Finish: None (Interior finish to be field applied – to match existing)
- B. Manufacturers: Tectum Inc., Newark , Ohio

### 2.2 ACCESSORIES

- A. Bulb-Tee Sub-purlins:
  - 1. Material: Steel
  - 2. Style: To match existing
  - 3. Manufacturers: Western Fireproofing Co., Kansas City, MO
- B. Grout:
  - 1. Material: Gypsum cement grout, ready for mixing with potable water.
- C. Screws:
  - 1. Material: 14-gauge with 2" diameter steel washer.  
Manufacturers: Tectum, Inc., Newark, Ohio
- D. Grout for masonry core fill: ASTM C476, coarse type.
- E. Adhesive:
  - 1. Material: Miracle Construction Adhesive.
  - 2. Type: Adhesive SFS-66.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine all roof deck surfaces for defects.
- B. Areas of deflection greater than 1/180 or obvious water damage shall be removed and replaced.

### 3.2 DECK REPLACEMENT

- A. In areas where deck replacement is required, the existing decking must be removed in lengths so that each piece of decking is bearing on half of the structural support in the field and fully on the support at terminations.
- B. Tongue and Groove panels must be removed in pairs to prevent damage to the tongue and grooves. The panels shall be cut at the center line of the structural support to allow the panels to be removed.
- C. Tile type panels shall be cut lengthwise in the center, parallel to tees. Clean grout from the tees.
- D. Tongue and Groove panels shall be installed in pairs. Each side shall be inserted into the respective tongue or groove and the panel folded into place. If the existing system has channels in the tongues and groove, the channels shall be replaced. The new panels shall be attached to the structural bar joist with screws and 2" plates.
- E. Tile type panels shall be inserted and must bear a minimum of 1/2" on each tee. The tile shall be centered on the tees and grouted into place.
- F. Refer to Tectum Bulletin 64 for additional information.

### 3.3 CLEANING

- A. After deck installation, clean and paint any scarred areas with equal type of finish as shop finish.

END OF SECTION 033000